

## CLIMATE CHANGE – VARIETY CHANGE?

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### ABSTRACT

In Franconia, the northern part of Bavaria in Germany, climate change, visible in earlier bud break, advanced flowering and earlier grape maturity, leads to a decrease of traditionally cultivated early ripening aromatic white wine varieties as Mueller-Thurgau (30 % of the wine growing area) and Bacchus (12 %). With the predicted rise of temperature in all European wine regions the conditions for white wine grape varieties will decline and the grapes themselves will lose a part of their aromatic and fruity expression. Variety change towards the cultivation of later ripening white wine varieties is a very expensive and long-term process, and must be accompanied by special marketing efforts.

In the “cool climate” region Franconia, adapted methods are required for the longer use of traditionally grown aromatic early ripening varieties. Studies about maturity management of the early ripening variety Mueller-Thurgau show first results. Cordon pruning compared with traditional spur pruned training system, leads in dependence of botrytis infection to a maturity delay of 4 up to 6 days. The new natural growth training system, also called “minimal pruning”, results in a maturity delay of 8 up to 12 days in the same varieties.

Later grape harvest times economize energy for must cooling and fermentation control. Lower night temperatures can better conserve the fresh and fruity flavours of these aromatic grapes. The consequences of maturity retardation effects on must and wine quality will be studied.

**KEYWORD:** Climate change, Franconia, earlier harvest time, variety change, canopy management

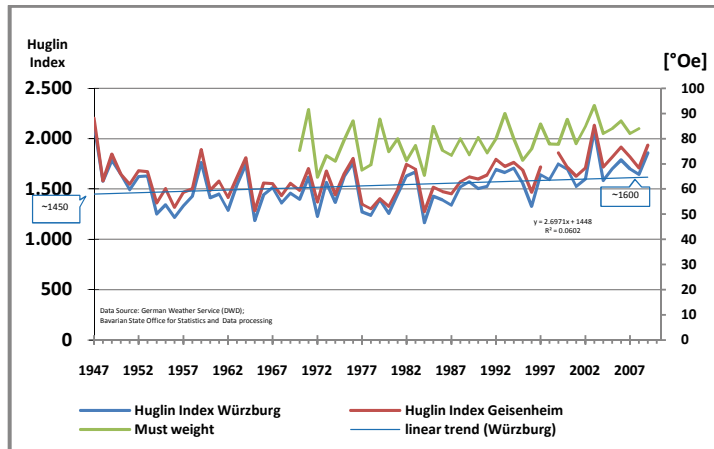
### Introduction

Franconia's wine region along the river Main, has a mainly continental climate with a yearly mean temperature of about 10,0 ° C and a yearly precipitation of about 550 mm. The vineyard area of about 6000 ha covers the slopes and steep slopes along the river mainly in S-SW exposition. White wine varieties are grown on 80 % of the area consisting of Mueller -Thurgau (28 %) and Bacchus ((Riesling x Silvaner) x Mueller-Thurgau) (12%). The later ripening Silvaner is Franconia's most famous variety and covers 21 %, the late ripening Riesling only 5 %. The residual area is planted with minor white wine varieties. 20 % of the area is covered with red wine varieties as for example Pinot Noir (4,3 %) and Domina (Portugieser x Pinot Noir) 5,7 %. Franconia is well known for its fresh and fruity white wines as Mueller-Thurgau and Bacchus, and for the soft and creamy Silvaner. With the climate change the early ripening varieties will diminish more and more.

### Signs of climate change

As shown in Figure 1, the average temperature has been increasing in our region (Würzburg) since 1950. Compared with the Rhine valley (Rhingau region/Geisenheim) both datalines show the same rising development. Because of the increasing temperatures, earlier bud break (8 days), earlier flowering (8 days) and earlier veraison (11 days) is documented for Mueller-Thurgau in Franconia (Hönig & Schwappach, 2003). Earlier harvest time is associated with a higher risk of fungus

infection as *Botrytis cinerea*, an augmentation of acetic acid, a faster reduction of total acid because of high night temperatures and a rising demand for cooling energy.



**Figure 1:** Development of the Huglin-Index for the region Franconia and Rhingau since 1947 and results of the mean yearly regional Franconian must weight (°Oechsle) since 1970

An increased cultivation of late ripening varieties for a longer utilization of the whole possible ripening period in September and October is in the phase of investigation. The introduction of new later ripening varieties will influence or even change the special regional wine character. This change needs a comprehensive discussion and a careful and integrated transfer.

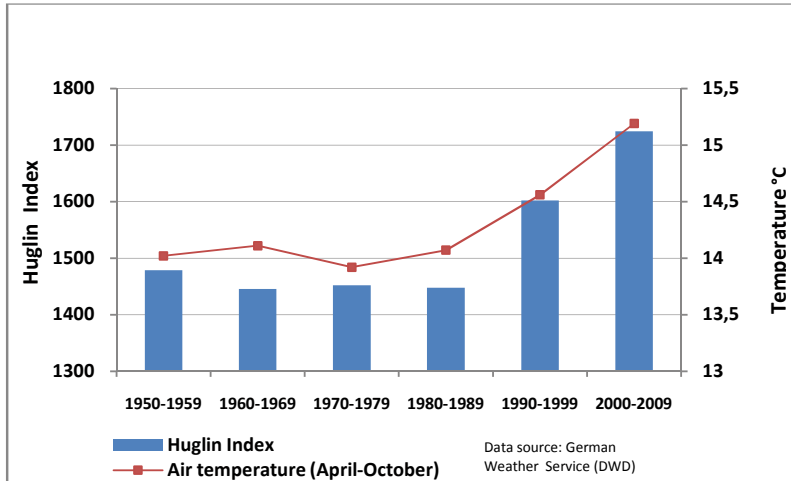
**Variety needs in temperature sums - the Huglin-Index (HI)**

Table 1 shows a comparison of the different grape variety needs in temperature sums during the vegetation period by means of the Huglin-Index. The Huglin-Index (HI) adds up all daily mean temperatures above 10° C in the vegetation period by means of a special formula. The temperature requirements to reach a good maturity level for the main German and European grape varieties are summarized in Table 1.

Huglin-Index	German grape varieties	selected European grape varieties
1300	Siegerrebe, Ortega, Reberger	
1400	Mueller-Thurgau, Bacchus,	
1500	Kerner, Portugieser	Gamay
1600	Silvaner, Grauburgunder, Schwarzesling	Chasselas, Pinot Meunier
1700	Weissburgunder, Sauvignon Blanc, Spätburgunder	Sauvignon Blanc, Pinot Noir, Grüner Veltliner,
1800	Riesling, Scheurebe, Gewürztraminer,	Chardonnay,
1900	Muskateller, Trollinger, Blaufränkisch	Merlot, Syrah, Viognier
2000	Cabernet Cubin,	Cabernet Sauvignon, Tempranillo
2100		Grenache, Cinsault, Sangiovese
2200		Carignan, Trebbiano, Airen
2300		Nebbiolo,

**Table 1:** Huglin-Index – for German and European grape varieties (preliminary classification)

As presented in Figure 2, the calculated HI has slightly increased in our vineyard region of Franconia/Würzburg in the last decades. A prognostic estimation of this development indicates a rapid change in the ripening period and requires a suitable reaction in direction to variety change.



**Figure 2:** Huglin-Index – Development of HI in decades in the Franconian region since 1950

Besides Riesling, Chardonnay and Sauvignon Blanc other late ripening European white wine varieties as Viognier, Muscat, and new German crossings are tested to improve the existing variety panel. Adapted measures are necessary to manage the present vineyards with early ripening varieties during the next decades.

### Experimental results

In addition to variety change, clonal selection and canopy management can result in a better adaptation to higher temperatures during the ripening period. First experiments with canopy reduction under our climate conditions showed negative results in the wine sensoric. By means of natural growing/minimal pruning acceptable ripening delay were obtained in the varieties Mueller-Thurgau and Bacchus. Aromatic and fruity, alcohol balanced wines were the result. Cordon pruning with one bud cuttings delayed the ripening period only for 4 up to 6 days, is however accompanied by a strong and not always desired yield reduction.

### Bibliography

Hönig, Petra and Peter Schwappach, 2003: Klimaänderung: Wie reagiert die Rebe?; Rebe und Wein, Nr. 11, p. 23-25